CONSTRUCTION
FATALITY DIGEST

QUARTERLY REPORT
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Topics of Interest

HASLAM COLLEGE OF BUSINESS
THE UNIVERSITY OF TENNESSEE, KNOXVILLE

CONSTRUCTION INDUSTRY
& RESEARCH POLICY CENTER

"All types of falls (roof, ladder, structure, opening, etc.) accounted for 45.0% (59 events) in the fourth quarter of 2017"

Roof Falls Lead All Fatal Construction Events

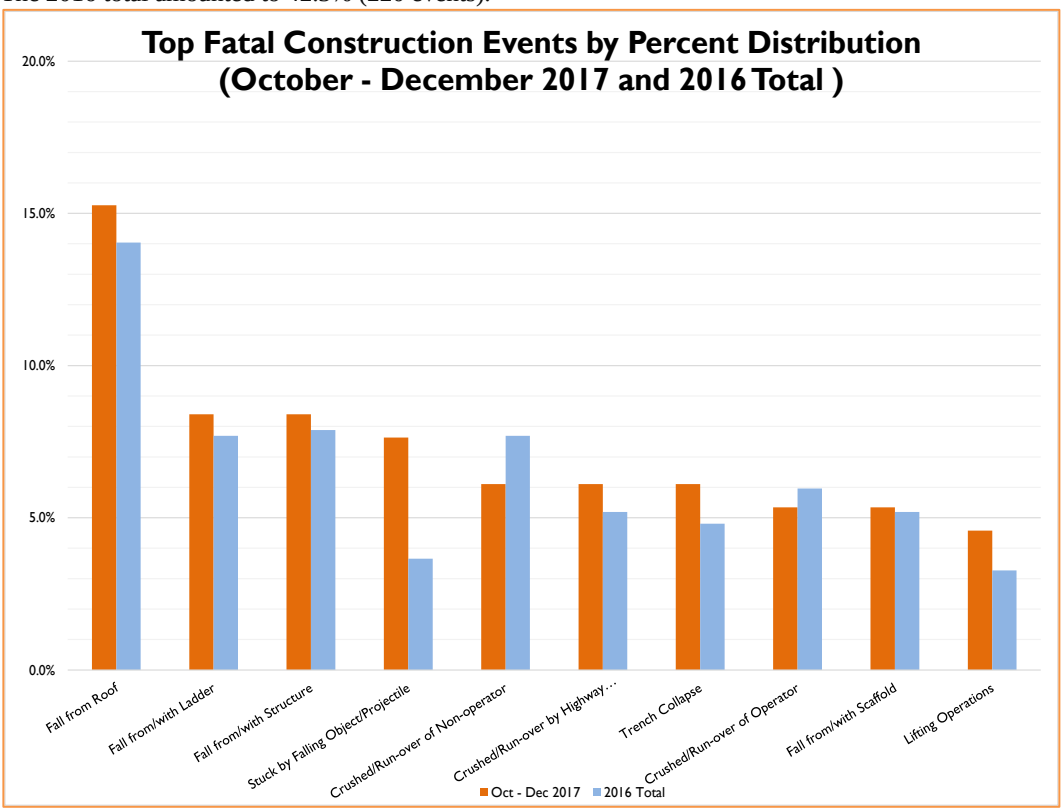
For the fourth quarter of 2017, CIRPC received 131 reports of fatal events in construction. For the most part the pattern of causes remained similar to the results reported for the first three quarters of 2017.

"Fall from Roof" led all categories with 20 events (15.3%) of the 131 events. This is nearly identical to the previous quarter (23 events, 15.4%). For all of 2016 "Fall from Roof" totaled 73 events (14.0%).

"Fall from/with Ladder" and "Fall from/with Structure" were the second leading causes each with 11 events (8.4%) followed by "Struck by Falling Object/Projectile" with 10 events (7.6%), and "Crushed/Run-over of Non-operator", "Crushed/Run-over by Highway Vehicle", "Trench Collapse" each with 8 events (6.1%).

There were two notable shifts. "Electric Shock from Equipment Installation/Tool Use" decreased from 10.7% (2nd leading fatal cause for the third quarter) to 3.1% for the current quarter. "Struck by Falling Object/Projectile" more than doubled from 3.4% (in the previous quarter) to 7.6% for the fourth quarter.

All types of falls (roof, ladder, structure, opening, etc.) accounted for 45.0% (59 events) in the fourth quarter of 2017. This is an increase from 41.6% (62 events) from the previous quarter. The 2016 total amounted to 42.3% (220 events).



Regional Breakdown

Of the 131 events reported for the fourth quarter of 2017, 25.2% came from Region 4 (33 events), 19.1% (25 events) came from Region 5, and 16.0% (21 events) from Region 6. Regions 4, 5, and 6 accounted for over 60% of the total.

Of these, 63.4% (83 events) were reported from Federal OSHA states, while 36.6% (48 events) occurred in State Plan states.

The breakdown by state revealed Texas with the greatest number of events with 18 (13.7%), followed by North Carolina with 10 (7.6%).

Fatal Events Reported by OSHA Region

October to December 2017

Region	# of Cases	Percent
1	4	3.1%
2	10	7.6%
3	13	9.9%
4	33	25.2%
5	25	19.1%
6	21	16.0%
7	7	5.3%
8	8	6.1%
9	8	6.1%
10	2	1.5%
Total	131	100.0%

Fatal Events by NAICS Code

A breakdown of top reported fatal events by NAICS code shows "Highway, Street, and Bridge Construction" contractors and "Roofing Contractors" at the top each with 9.2% (12 events) of the total events. Other top codes are "Commercial and Institutional Building Construction" contractors with 8.4% (11 events) followed by "Water and Sewer Line and Related Structure Construction" contractors, "Structural Steel and Precast Concrete Contractors", and "Electrical Contractors" each with 6.9% (9 events).

Fatal Events by NAICS Code

Code	Description	# of Cases	Percent
237310	Highway, Street, and Bridge Construction	12	9.2%
238160	Roofing Contractors	12	9.2%
236220	Commercial and Institutional Building Construction	11	8.4%
237110	Water and Sewer Line and Related Structures Construction	10	7.6%
238120	Structural Steel and Precast Concrete Contractors	9	6.9%
238210	Electrical Contractors	9	6.9%
238910	Site Preparation Contractors	9	6.9%
238220	Plumbing, Heating, and Air-Conditioning Contractors	8	6.1%
236115	New Single-Family Housing Construction	7	5.3%
238990	All Other Specialty Trade Contractors	7	5.3%
236118	Residential Remodelers	6	4.6%
238320	Painting and Wall Covering Contractors	5	3.8%
238310	Drywall and Insulation Contractors	4	3.1%
237990	Other Heavy and Civil Engineering	3	2.3%
238110	Poured Concrete Foundation and Structure Contractors	3	2.3%
238190	Other Foundation, Structure, and Building Exterior Contractors	3	2.3%
237130	Power and Communication Line and Related Structures Construction	2	1.5%
238130	Framing Contractors	2	1.5%
238140	Masonry Contractors	2	1.5%
238170	Siding Contractors	2	1.5%
236116	New Multifamily Housing Construction	1	0.8%
236210	Industrial Building Construction	1	0.8%
237120	Oil and Gas Pipeline and Related Structures Construction	1	0.8%
238340	Tile and Terrazzo Contractors	1	0.8%
238350	Finish Carpentry Contractors	1	0.8%
		131	100.0%

Top Construction Standard Violations During 2017

For the 520 fatal events for 2017, 277 case files reported a total of 931 violations of OSHA standards. Since inspectors have up to six months to issue citations on a fatality it is likely that additional citations will be forthcoming.

The violations and their frequencies are listed in the table below. The average number of violations per case with citations issued was 3.36. For the three previous calendar years, 2014, 2015, and 2016 the average number of violations per case was 3.86, 3.24, and 3.43 respectively.

The "Scaffolding" standard is the top violation for the year to date with 86 occurrences, followed by "Fall Protection" with 69, "Fall Protection Training" with 48, "Fall Protection Systems Criteria and Practices" at 46, and "Ladders" with 35 occurrences.

When comparing the total of 2017 calendar year violations with OSHA's top standards violated in Fiscal Year 2017 (per www.osha.gov), there are many similarities. "Fall Protection", "Hazard Communication", "Scaffolding", and "Ladders" appear in the top standards violated on both CIRPC's and OSHA's list.

Top OSHA Standard Violations Reported (2017)

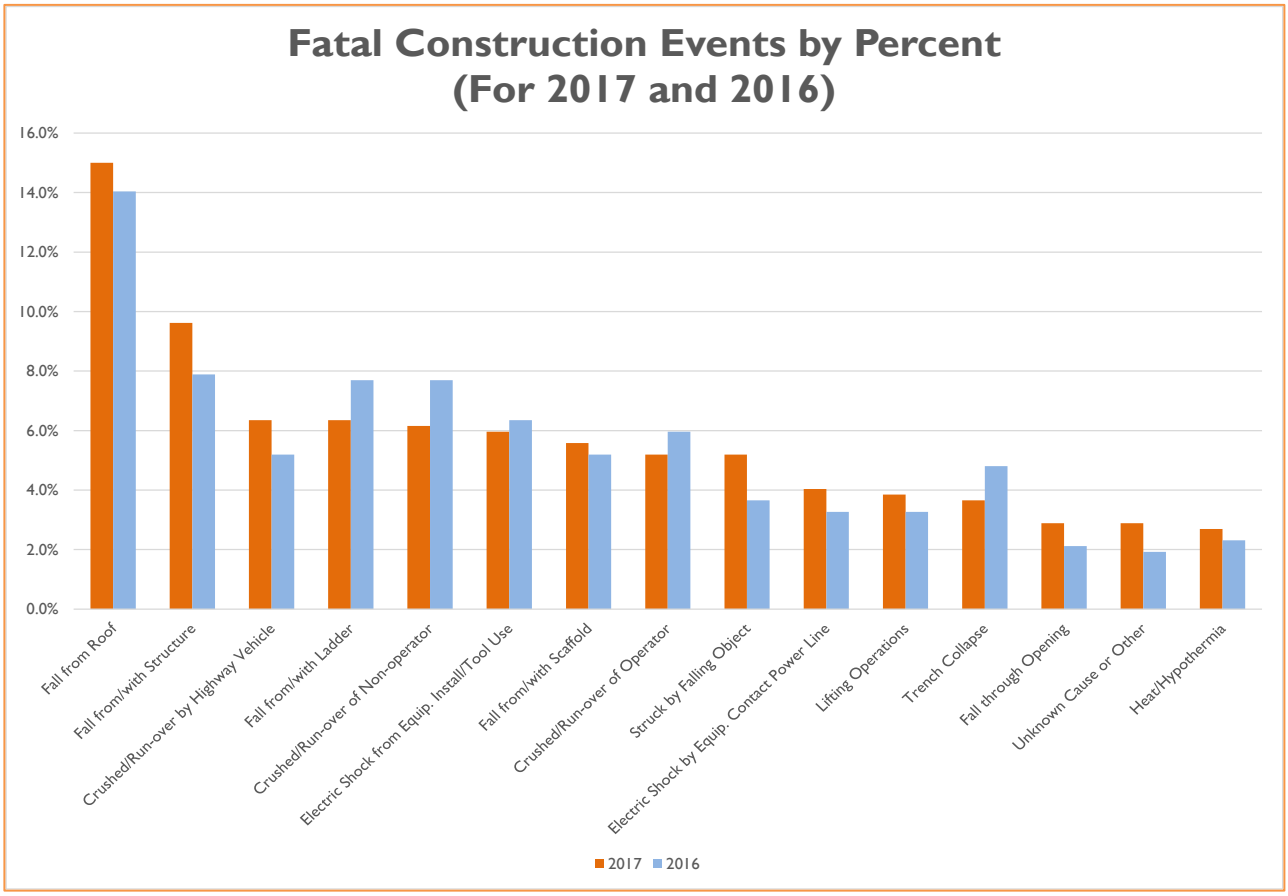
Rank	Std #	Description	# of Occurrences
1	1926.451	Scaffolding	86
2	1926.501	Fall Protection	69
3	1926.503	Fall Protection Training	48
4	1926.502	Fall Protection Systems Criteria and Practices	46
5	1926.1053	Ladders	35
6	1904.39	Reporting Fatalities & Multiple Hospitalization Incidents	34
T7	1926.21	Safety Training and Education	29
T7	5a1	General Duty Clause	29
9	1910.1200	Hazard Communication	24
T10	1926.20	General Safety & Health Provisions	22
T10	1926.651	Excavation	22
12	1926.416	Electrical, General Requirements	21
13	1926.454	Scaffold Training	18
14	1926.100	Head Protection	14
15	1926.652	Excavation, General Requirements for Protection Systems	13

2017: The Year in Review

There were 520* events reported by OSHA to CIRPC for the calendar year which is the same total (520) as for 2016. In 2017, roof falls led all reported fatal events with 15.0% (78 events) of the total. Roof falls also led all events in the previous three years.

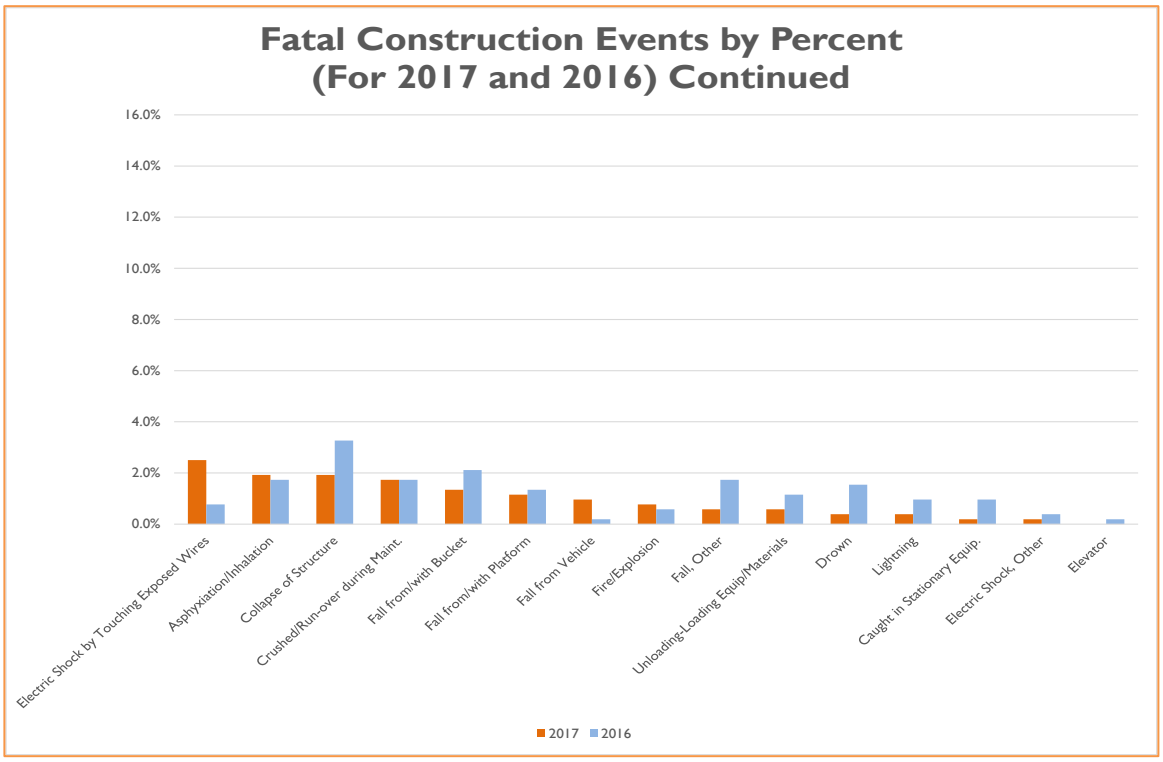
Rounding out the top events for 2017 are "Fall from/with Structure" with 9.6%, followed by "Crushed/Run-over by Highway Vehicle" and "Fall from/with Ladder" each with 6.3%, and "Crushed/Ru-over of Non-operator" with 6.2%.

When comparing the fatal events from 2016 with the 2017 events, one can see little ranking changes for the events. All events had less than a 2.0% change from the previous year's percent total. "Fall from/with Structure" and "Electric Shock by Touching Exposed Wires" each had the greatest increase at 1.7% (from 2016 totals). "Crushed/Run-over by Non-operator" experienced the largest decrease (1.5%) from the 2016 totals.



* The 520 events were OSHA jurisdiction cases only and may not total the fatal construction events reported by others sources.

2017: The Year in Review (Continued)



Falls (all types) again topped the list of grouped fatal events with 43.5% of all events in 2017. This was a slight increase of 1.2% over the total from 2016. Crush/Run-overs (19.4%) and Electrocutions (12.7%) rounded out the top three grouped fatal events. The top three grouped events accounted for over 75% of all the fatal events in 2017.

Grouped Fatal Construction Events Comparison

Grouped Event	2017	2016	2015
All Falls	43.5%	42.3%	41.7%
All Crush/Run-overs	19.4%	20.6%	17.9%
All Electrocutions	12.7%	10.4%	11.9%
Other Events	24.4%	26.7%	28.5%

Disabling Workplace Injuries

Each year Liberty Mutual, one of the largest insurance under-writers, ranks the top ten causes of injuries that lead to workers becoming disabled. The ranking does not include fatal events.

In terms of cost, the 10 leading causes of the most disabling work-related injuries accounted for $49.9 billion, or 83.4 percent of the total cost of $59.9 billion. The top three causes – which collectively represent almost half of the cost of the leading accidents – are overexertion ($13.8 billion, 23 percent), falls on same level ($10.6 billion, 17.7 percent) and falls to lower level ($5.5 billion, 9.2 percent).

It was also noted that falls and highway vehicle accidents both continue to rise from previous years, but overexertion decreased substantially.

Courtesy of 2017 Liberty Mutual Workplace Safety Index (based on 2013 injury data).

Summary of Fatal Events

Below is a random selection of 39 fatal event summaries from the 131 cases reported for the quarter. These narratives are taken directly from the reports filed by the OSHA's Certified Safety and Health Officials (CSHOs) with only minor editing.

CATEGORY: ROOF FALLS

Inspection Number: 1290982
An employee was engaged in roofing work on a dormer when the employee fell from the steep pitched roof with an eave height of 12 feet.

Inspection Number: 1287183
An employee fell approximately 20 feet to the ground as he stood on a skylight. The employee was performing roofing repair at the time of the accident. The employee died from the injuries suffered.

Inspection Number: 1281149
The employee returned from lunch and was walking back to his work area on the roof without tying off. The employee stepped onto and fell through a flush-mounted fiberglass skylight. The employee fell approximately 18 feet to the concrete surface below.

CATEGORY: OTHER FALL EVENTS

Inspection Number: 1287721
During a job for residential house foundation, limbs from a near-by tree needed to be removed. The victim jumped up on dozer blade with a chainsaw to remove the limb while the owner was in the driver's seat of the dozer at the controls. The bulldozer's engine was on and in gear. Deceased pulled the saw to start and lost his footing. He fell to the ground below in front of the dozer. The owner was startled by the fall and his foot slipped onto the accelerator causing the dozer to move forward and run over the victim.

Inspection Number: 1285209
The victim was painting the ducting and decking in the ceiling of a commercial facility. A co-worker was walking back from the other side of the room and saw the victim's back leaning against the top rail of the bakers scaffold. The victim was painting above and behind his body. While leaning he fell over the top rail backwards landing on his head.

Inspection Number: 1275240
Employee was working from a scissor lift approximately 12 feet above the concrete floor. The entrance gate of the lift was wired open. It appears the employee fell from the opened gate area and landed on his right side and striking the right side of his head.

CATEGORY: OTHER FALL EVENTS (Continued)

Inspection Number: 1274783
The decedent and the connection crew of three were in the process of installing a precast wall on the 11th floor of a building. The precast member was not aligning properly, the decedent was told to go to 10th floor to remove a brace so that precast wall could easily slide in place. Before the decedent could reach the brace, the precast wall began to align into place. A connection crew member closest to edge of the building heard a noise from behind him coming from boom lift. The employee turned around and the decedent was not in the basket, the employee went to edge of the floor and looked down to see the decedent had fallen to the ground.

Inspection Number: 1294339
An employee was climbing down an aluminum framed extension ladder from the roof of a single story commercial building. The employee slipped while climbing down the ladder, falling approximately seven feet to the ground below.

Inspection Number: 1272369
The victim, an electrician, was setting up the room for an upcoming inspection. He was on a 10 foot fiberglass A-frame ladder possibly reaching for a junction box, approximately 14 feet high. He was at the 6-foot step. By extending himself from the ladder, the ladder began to slip in the opposite direction. A helper was present trying to hold the ladder in an attempt to prevent the employee from falling. While holding the ladder it slipped and both the ladder and the employee fell to the ground. The employee sustained head trauma and was rushed to the ER where he was later pronounced deceased.

Inspection Number: 1293228
Employee stepped on an overhang and the slats gave way, he fell striking head on ground.

Inspection Number: 1289448
Two employees were working at a height of approximately 43 feet and were flagging a crane used to lift a bundle of metal decking, weighing approximately 3,871 pounds per bundle, to be placed on top of installed bar joists. Both employees were wearing harnesses and were tied-off to the bar joist below them that they were walking on. One employee had flagged in one bundle and placed it on the bar joists close to the girder joist. Then they flagged in a second bundle and placed it approximately 6 feet and 6 inches away from the girder joist, butting up against the first bundle. They were in the process of unhooking the bundle when the bar joists collapsed (8 in total). One employee suffered life threatening injuries and died at the hospital. The second employee suffered fractures to the right thumb, left wrist, right femur, skull and contusions to the back.

CATEGORY: OTHER FALL EVENTS (Continued)

Inspection Number: 1278093
The victim was working from a 20 foot aluminum ladder (extension) inside of a residential home on wooden floors. Skid cloth was used under the feet of the ladder, but the feet still slid out causing him to fall with the ladder and strike the floor. There were no witnesses to the incident.

Inspection Number: 1271766
The victim was giving a client an estimate for an installation of a sound system at a local church. He got up on a portable ladder and slid over a piece of ceiling tile from a drop ceiling. During this process he somehow fell from the ladder and struck his head on the floor. It is undetermined what caused the employer to fall from the ladder. The ladder was on a flat dry surface and there were no environmental conditions that may have had an impact on the incident. He was transported to the hospital where he passed away from his injuries.

Inspection Number: 1271502
An employee was working on the top of an elevator of a grain elevator when he fell 100-150 feet and died. It was reported that he was wearing a harness at the time but was not tied off to anything.

Inspection Number: 1296187
Three workers were laying a chalk line in the interior of a new construction residential home that they were framing. After the chalk line was laid, the deceased then turned to get the saw to start cutting the wood. When he turned, his foot contacted a patch of ice, and his feet flew out from under him and he fatally struck the back of his head on the wood floor.

CATEGORY: ELECTROCUTIONS

Inspection Number: 1271963
Employee was found outside of dump truck with dump section raised and in contact with overhead power lines.

Inspection Number: 1289073
The victim was changing out a 480 Volt breaker while hot. He was not in arc flash PPE nor using insulated tools. During the change out, he touched the switch gear cabinet with a driver while securing the new breaker to one of the poles. Contacting the switchgear cabinet caused a short and arc flash. He was taken to the hospital in critical condition where he passed away. A co-worker received burns on his arms attempting to aid the victim. The co-worker was later released from the hospital. A second co-worker was burned attempting to aid the victim but was not hospitalized.

CATEGORY: ELECTROCUTIONS (Continued)
Inspection Number: 1278098
A worker on a ladder received an electric shock while working on an energized circuit, which caused him to fall from the ladder sustaining a fatal head injury.

CATEGORY: STRUCK BY, RUN OVER, CRUSHED BY OPERATING CONSTRUCTION EQUIPMENT/VEHICLE
Inspection Number: 1274721
A dump truck was backing up inside a construction work zone area, while another worker decided to cross the work zone. The driver continued to travel in reverse did not see her behind him. She was struck-by the truck and pronounced dead at the scene.

Inspection Number: 1294545
The decedent was supervising the excavation of a hole for a concrete foundation. An employee subcontracted by the decedent was operating the excavator. The employee finished digging and began to rotate the bucket so he could place the machine in park. While rotating, the back end of the excavator struck the decedent and knocked him into the excavation. The fall was approximately 15 feet to an uneven rocky surface partially filled with about one foot of concrete. He died from his injuries at hospital.

Inspection Number: 1296087
A welder was struck by an excavator that slid downhill after making contact with a patch of ice.

Inspection Number: 1284472
A group of three vehicles were in a temporary traffic zone installing pavement buttons (highway markers) on a highway. The decedent was walking and installing the buttons near the middle vehicle when that vehicle suddenly swerved over, running the decedent over.

Inspection Number: 1285941
The employee was a spotter for dump trucks at a landfill site. He noticed a dump truck starting to dump a load in the wrong location and ran across the site to stop the dumping. He was in the path of a bull dozer doing its regular duty and was not seen by the bull dozer operator which backed over him causing the fatality.

Inspection Number: 1276298
The victim drove the service truck to the company equipment yard facility. The decedent got out of the truck to unlocked the padlock to the gate of the facility. He was found later by the Fire Department with the truck still in drive and on top of him.

CATEGORY: STRUCK BY, RUN OVER, CRUSHED BY OPERATING CONSTRUCTION EQUIPMENT/VEHICLE (Continued)

Inspection Number: 1292103
The driver of a dump truck was under the vehicle attempting to make repairs. He was run over and killed by the wheels of the vehicle when it was pushed by a track excavator, whose operator believed the dump truck driver to be in the cab of the dump truck.

Inspection Number: 1290223
The victim and his co-workers were onsite assessing traffic control when an 18 wheeler lost control, jack knifed, and crossed the median striking and killing the victim.

CATEGORY: OTHER FATALITY CAUSES

Inspection Number: 1289825
Two employees were washing a train tanker car. One employee entered the tanker and was found face down in a liquid. The second employee entered the tanker to help. Both employees were found unresponsive. It is estimated the employees were in the tank for 5-10 minutes. The first employee was pronounced dead. The second employee was hospitalized.

Inspection Number: 1293367
Four employees were cutting in the key way in the bottom of a trench in preparation to install forms for the footings. A previous constructed cement retaining wall, buckled, broke apart and a section of the wall and soil behind the wall collapsed into the trench burying one of the four employees in the trench. The other three employees escaped from the trench.

Inspection Number: 1291923
Heavy equipment operator utilizing a roller slid down an embankment causing the roller to overturn. The operator was not wearing a seatbelt and the equipment roll over protection fatally crushed the operator.

Inspection Number: 1296251
Victim was working inside an 8 foot trench box located inside a trench greater than 16 feet deep when the trench wall caved-in trapping the victim inside the trench box. After co-workers removed the trench box the victim was covered by a second cave-in.

Inspection Number: 1282165
Employees were engaged in sewer installation of an 8 inch, 14 foot long PVC sewer pipe inside a trench approximately 5 1/2 deep. One employee was buried when the trench wall sheared off and caved in.

CATEGORY: OTHER FATALITY CAUSES (Continued)

Inspection Number: 1282355
The victim was inside a trench box compacting gravel with other employees. They finished working and exited the trench box. The employees believed everyone was out of the trench and signaled the operator to begin filling the trench. The operator began filling the trench and the victim was buried inside.

Inspection Number: 1275608
Employee was unloading scrap material from trailer into dumpster. Employee suffered bee/wasp sting while performing job duties and went into anaphylactic shock.

Inspection Number: 1282349
The workers were suspended from helicopter lines putting ropes around high power electric lines. The helicopter lines failed and the suspended workers fell 100 feet to the ground. The power lines are on towers that are 150ft. in height.

Inspection Number: 1292910
Four individuals were performing foundation work at a residential site. The home was raised to approximately four feet in height and placed on cinder blocks. The home shifted and fell from the cinder blocks crushing two individuals who were working underneath the home. The two individuals were pronounced at the scene as a result of their injuries.

Inspection Number: 1014428
A gasoline powered chop saw was being used to cut a concrete pipe. The saw became "pinched" in the material and "kicked-back" striking the victim in the neck, resulting in the fatality.

Inspection Number: 1272005
Employee was purging a gas line leading to a HVAC unit when the gas ignited and burned the employee.

Inspection Number: 1294440
A traffic signal pole was being moved by a crane when a cable snapped and the pole fell and struck an employee assisting in the process.

Inspection Number: 1284504
Employees were in the process of painting metal beams before installing them. They had the beams leaning against the building, the decedent was underneath one of the beams when the beam fell on top of him, causing severe head trauma.

What is National Ladder Safety Month?

National Ladder Safety Month is the only movement dedicated exclusively to the promotion of ladder safety, at home and at work. During March 2018, National Ladder Safety Month will bring heightened awareness to the importance of the safe use of ladders through resources, training and a national dialogue.

The goals of National Ladder Safety Month are to:

- Increase the number of ladder safety training certificates issued by ALI
- Increase the frequency that ladder safety training modules are viewed on www.laddersafetytraining.org
- Lower the rankings of ladder-related safety citations on OSHA's yearly "Top 10 Citations List"
- Decrease number of ladder-related injuries and fatalities
- Increase the number of in-person ladder trainings
- Increase the number of companies and individuals that inspect and properly dispose of old, damaged or obsolete ladders

National Ladder Safety Month is presented by the American Ladder Institute (ALI).

(Information courtesy of American Ladder Institute)

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We would like to thank OSHA's Dave Schmidt for help in obtaining the data used in this newsletter. Comments and suggestions can be directed to John Wagner (jpwagner@utk.edu) as we work together to contribute to a safer construction workplace.